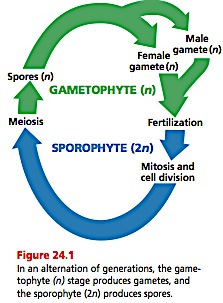
Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_ Pd: \_\_\_\_

**Botany 322: Introduction to Ferns**

**Part I: Fern Anatomy**: Use the given link (Fern Structure Interactive Vocabulary: http://goo.gl/mTlKVf) to illustrate both the top and bottom of a fern. Be sure to appropriately label each

feature.

Computer Illustration Collected Specimen Illustration

**Alternation of Generations**

As shown in *Figure 24.1*, an alternation of generations consists of a **sporophyte** stage and a **gametophyte** stage.

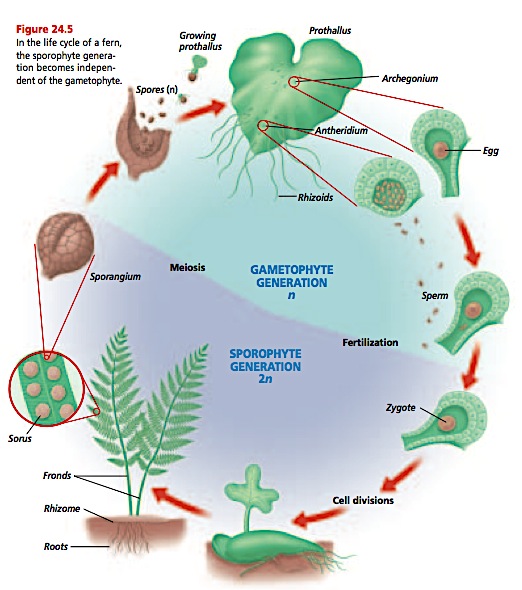
All cells of a **sporophyte** are **diploid**. Certain cells of a sporophyte undergo **meiosis**, which produces haploid spores. These spores undergo cell divisions and form a multicellular, haploid gametophyte. Some cells of a gametophyte differentiate and form haploid gametes. The female gamete is an egg and the male gamete is a sperm. When a sperm fertilizes an egg, a diploid zygote (resulting one-celled organism) forms. This is sexual reproduction. The zygote can undergo cell divisions and form an embryo sporophyte. If the embryo develops to maturity, the cycle can begin again.

This basic life cycle pattern is the same for most plants. However, there are many variations on this pattern within the plant kingdom. In flowering plants (tulip for example), the gametophyte is microscopic. Most people have never even seen the female gametophyte of a flowering plant! Botanists usually refer to the bigger, more obvious plant as the dominant generation. The dominant generation lives longer and can survive independently of the other generation. In most plant species the sporophyte is the dominant plant.

**Life Cycle of Ferns**

The dominant stage of the fern life cycle is the sporophyte stage. The fern sporophyte includes the familiar fronds as shown in *Figure 24.4A*. Fern fronds grow from a **rhizome**, which is an underground stem. On the underside of some fronds are **sori**, which are clusters of sporangia. Meiosis occurs within the sporangia, producing haploid spores. When environmental conditions are right, the sporangia OPEN UP and release haploid spores as show in *Figure 24.4B****.***

A spore can germinate to form a heart-shaped gametophyte called a **prothallus**, as shown in *Figure 24.4C*. The prothallus produces both archegonia and antheridia on its surface. The flagellated sperm released by antheridia swim through a film of water to eggs in archegonia. If fertilization occurs, the diploid zygote can develop into the sporophyte. Initially, this developing sporophyte depends upon the gametophyte for its nutrition. However, once the sporophyte produces green fronds, it can carry on photosynthesis and survive on its own. The prothallus dies and decomposes as the sporophyte matures. The mature fern sporophyte consists of a rhizome from which roots and fronds grow. If pieces of rhizome break away, new fern plants can develop from them by vegetative reproduction. Sproangia can develop on the fronds, spores can be released, and the cycle can begin again. The life cycle of the fern is summarized in *Figure 24.5*.

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